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Mesenteric rent, ileal volvulus and ileocolic intussusception in a 3-year-old large-white dry sow: A postmortem report

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Abstract

This report presents a post-mortem (PM) finding of Large-White dry sow which died from complications associated with mesenteric rent, volvulus and intussusception. Other lesions included hydrothorax, ascites, and engorged mesenteric blood vessels, pale and enlarged liver. Helminthological and protozoological examinations of the intestinal samples were negative. Diagnosis of mesenteric rent, ileal volvulus and intussusception was reached. The diagnosis was attributable to the risk factors which include fight, excessive amounts of dry whey concentrate coupled with poor hygiene in the feeding and management system. Familiarizing swine farmers with the symptoms of bowel obstruction and provision of diagnostic facilities in commercial piggery farms will help in facilitating diagnosis and prompt action to prevent mortality and minimize economic loss.

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Introduction

Bowel obstruction has been documented throughout history, with cases detailed in the Ebers Papyrus of 1550 BC and by Hippocrates (Yeo *et al.*, 2012). Wang *et al.* (2016) reported about 3.2 million cases of bowel obstruction occurred in human in 2015 which resulted in 264,000 deaths. Both male and female sexes were equally affected and the

condition can occur at any age (Ferri, 2014). According to Zachary & McGavin (2012), volvulus is the pathologic twisting of an organ along its longitudinal axis whereas torsion involves pathologic twisting of an organ about the axis of its mesentery. The twisting that occurs in either volvulus or torsion can result in complete or partial luminal obstruction

depending on the degree of malpositioning. Martis *et al.* (2013) defined intussusception as the invagination of a proximal part of a tubular organ into its more distal part, usually as a result of increased peristalsis in the more cranial part. These are life-threatening conditions that compromise free flow of blood in the wall and within the lumen leading to ischemia and necrosis of intestinal segments, giving rise to sepsis, circulatory shock, and death. The conditions appear to be most common in horses, followed by cattle, swine and then dogs and cats (Smith, 2015; Weygaerde *et al.*, 2015). Mesenteric rent, volvulus, and incarceration or intussusception have not been reported in the same necropsy case in swine. Weygaerde *et al.* (2014) published a case of volvulus and intussusception while Catalano *et al.* (2004) published a case report of volvulus, intussusception, and entrapment in a horse. Gross Pathological examination allows visualization of visceral and organ topography and allows the diagnosis of intestinal obstruction to be made. Intestinal volvulus has been an identifiable variable finding in necropsy, but sometimes may not be seen, probably due to transport or post-mortem repositioning of the gut (Straw *et al.*, 2002). More researches are necessary to further investigate, and to fully understand the management and any predisposing factors that are likely to act as triggers in order to improve animal welfare in fattening farms and to avoid huge economic losses.

Case Presentation

The carcass of a 3-year-old large-white dry sow weighing 265 kg from a piggery was presented for necropsy at the Department of Veterinary Pathology, Ahmadu Bello University (A.B.U.) Zaria, on the 2nd October, 2019. History revealed that the sow was found dead in the morning. A day earlier, 8 pigs were kept in the pen instead of the normal density of 4 to 6 per pen, due to insufficient space and consequently resulted in serious fight among the pigs, few minutes after feeding. There were 405 pigs on the farm managed under intensive system, and fed mainly once daily with dry compounded concentrate containing whey. History further revealed that similar form of sporadic death was recorded in the past. Routine deworming and vaccinations were up to date.

The necropsy was conducted according to standards, head to tail procedure (King *et al.*, 2014). On external examination, the carcass showed a rough coat, bloated abdomen, sunken eyes, with congested mucous membranes of the eye, mouth, vulva and anus. Internal examination revealed a very pale carcass, hydrothorax (60 mL), slightly pale and flabby lungs, atrophy of coronary fat, ascites (750 mL), thin-walled bloated small and large intestine with gas, displaced intestinal segment (from around the proximal third of the ileum to the ileocolic junction) appeared severely congested, haemorrhagic and necrotic (Plate I). A segment of the ileum was

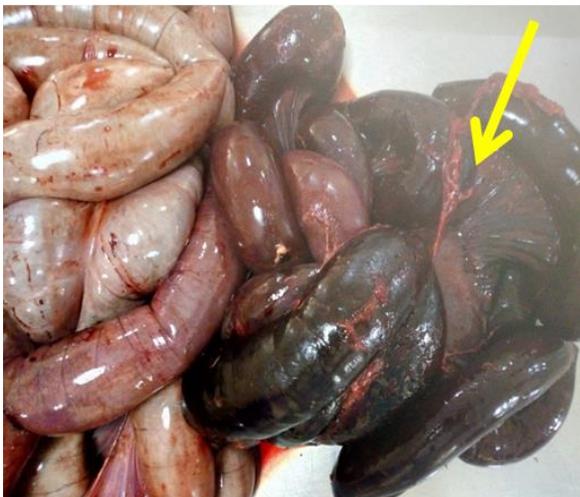


Plate I: Small intestine of a sow showing a volvulus (yellow arrow) from around the proximal third of the ileum to the ileocolic junction. Note the severely ballooned intestine, and severely congested, haemorrhagic and necrotic displaced intestinal segment



Plate II: Intestine of a sow showing a segment of the ileum twisted into a conical shape whose tip was tightly tucked on the mesentery rent (pointer). Note the consolidated and opaque appearance of mesentery (yellow arrow)

twisted into a conical shape with its tip tightly tucked on the mesenteric rent (Plate II). Mesentery appeared firm and opaque (Plate II).

Severely enlarged mesenteric lymph nodes, and engorged mesenteric blood vessels which appeared as black lines converging on the root of the mesentery where the twisting had taken place. The distal part of the ileum invaginated into the colon just around the ileocolic junction (Plate III). Other observed lesions included; pale and enlarged liver, and congested enlarged kidneys. Furthermore, a herd examination revealed a poor hygiene in the management and feeding system. Intestinal samples sent for helminthological and protozoological examinations were negative. Microbiological investigation of intestinal contents or faecal samples was not conducted. Therefore, diagnosis of mesenteric rent, ileal volvulus and ileocolic intussusception was made.

Discussion

The present report of intestinal obstruction and similar cases were mainly incidental findings at necropsy. Several physiological, anatomical and dietary causes have been implicated in the aetiology of the conditions (Smith, 2015). Numerous reports associated with consumption of large volumes of wet or liquid whey; occurrence of volvulus in pig due to high fermentable components in feeds leading to a fermentative imbalance with predisposition to intestinal volvulus and intussusception.

In the current case, the initial lesion could be the rent of the mesentery through which a loop of the ileum was trapped. This volvulus could be the second stage of the pathogenesis as more of the piece of ileum forced itself resulting in intussusception. Further twisting could have resulted in the strangulation. Increased peristalsis is likely to cause more entanglement of the intestines.

Increased peristalsis could occur just before and after volvulus has set in, as a response to pain. We therefore hypothesize that; such findings should be common, given that volvulus or torsion cause pain which in turn increases peristalsis. Though, diagnosis of intestinal torsion is often difficult, because of a potential repositioning of the mesenteric root after death (Straw *et al.*, 2002). Straw *et al.* (2002) also reported that the genetic variation such as a longer body in the modern pig breeds seems to have impact on the likelihood of intestinal torsions. A diagnosis of mesenteric rent, ileocolic volvulus and intussusception was made on the basis of the gross appearance of the lesions.

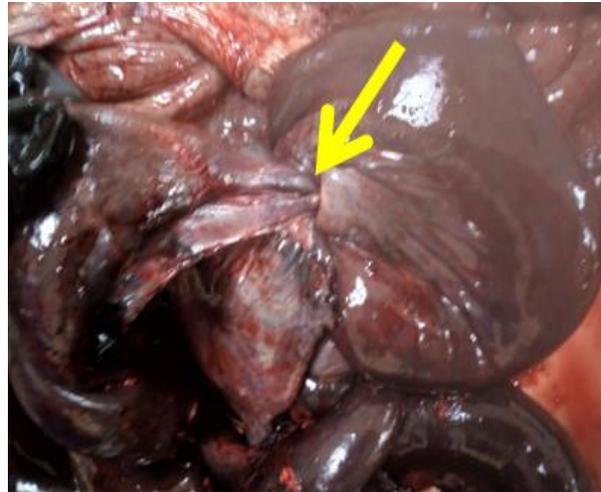


Plate III: intestine of a sow showing invaginated distal part of the ileum into the colon at ileocolic junction (yellow arrow)

The mesenteric rent might have occurred as a result of the rigorous fight in which the sow was involved that resulted in abdominal trauma and consequently tear of the mesentery. This assertion was supported by Straw *et al.* (2002) who described fighting mounting and playing as risk factors for intestinal volvulus in pigs, more importantly, when these behaviours occur in parallel with ingesting large volumes of feed associated with previous reduced feeding frequency. The concurrent weight of the ingesta, from sudden large volumes of feed is sufficient to rotate the gut. Furthermore, the pigs were also fed dry whey concentrate with a possibility of one animal consuming more than others, which may also independently lead to impaction, hypermotility, volvulus and the attendant complications. The possibility of fermentation of nutrients reaching the large intestine, resulting in large intestinal distension, is seen as critical. Abnormal fermentation coupled with over-feeding result in abnormal gas formation in both the small and large intestines, increases pressure and facilitates twisting of the structures. Whey is often included in these diets because of the high amino acid content and digestibility. However, the high amounts of sodium and lactose as well as the high variability amongst the different batches require a perfect management of whey transport, feeding and storage in order to guarantee a diet of constant quality.

Obstructive conditions of the small intestines can either be complete or incomplete. In both cases, these lesions fundamentally interfere with organ blood circulation by pressure arising from within as well or without the tubular organ resulting in

occlusion of the lumen of the organ. Intestinal mucosal barrier is tempered with as a result of mural ischemia and hypoxia of the intestine, thereby bacterial endotoxins can then readily diffuse through the damaged mucosal wall into the systemic circulation, resulting in endotoxemia, circulatory shock, and death. The prominence of mesenteric veins is most likely associated with obstruction of venous blood flow, which could partly account for the ascites observed. The progressive twisting could further result in hepatic venous and lymphatic occlusion/ compression, vascular engorgement, ischemia, and ultimately necrosis of the affected intestinal segments. Obstructive conditions such as volvulus, torsion, intussusception and entrapment or strangulation or incarceration normally result in organ hyperemia/congestion leading to ischemic necrosis of the affected part.

In conclusion, the present report had shown the combined occurrence of mesenteric tear, ileal volvulus and ileocolic intussusception in a sow. Although several factors could lead to the occurrence of intestinal volvulus and intussusception, in the present case report, it is suggested that problems such as the struggle, over-feeding with dry whey coupled with inadequate management system might have exacerbated the condition.

Management practices should be improved in the piggery generally, but especially feeding, stocking density and hygiene. Familiarizing swine farmers/practitioners with the symptoms of bowel obstruction and provision of diagnostic facilities in commercial piggery farms will help in facilitating diagnosis and prompt action to prevent mortality and minimize economic loss.

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Conflicts of Interest

The authors declare no conflict of interest.

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